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# Urban Forest Plan

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# Urban Forest Plan

City & County of San Francisco

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Urban Forestry Council &
Department of the Environment

April 2006

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Dr. Jim Clark of HortScience prepared this document with assistance from the Urban Forestry Council and the Department of the Environment.

This Urban Forest Plan is intended for use in the City and County of San Francisco. It is the first step in a process that will incorporate the Urban Forest Plan into San Francisco's General Plan. This plan is a living document that can be changed and adapted.

This plan will be distributed to the Board of Supervisors, Mayor's Office, City departments and agencies, community groups and members of the public. We welcome input and questions regarding the Urban Forest Plan. Please contact the Department of the Environment, Urban Forestry Council Coordinator, Alexis Harte, 11 Grove Street, San Francisco, CA 94102, 415-355-3764, alexis.harte@sfgov.org or Grace Ma, Urban Forest Associate, 415-355-3731, grace.ma@sfgov.org.

The Urban Forestry Council approved this document on February 28, 2006 and it was forwarded to the San Francisco Board of Supervisors on April 2006.

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## EXECUTIVE SUMMARY
## San Francisco Urban Forest Plan
April 2006

People appreciate and enjoy San Francisco's 668,000 trees. Few trees in this unique urban forest arose naturally--almost all were planted. The framework of this forest was established during an intense burst of tree planting that occurred in the late 1800s and early 1900s. City government, the Army, citizens, and real estate developers all took part, planting trees by the thousands. But since the 1920s, planting of new trees has not kept pace with losses due to old age, disease, storms, civic improvement, and development.

Today, San Francisco's urban forest can be characterized as inconsistent and incomplete. Though a framework of planting was begun, it was never completed. Trees that were established in the early years of the last century are nearing the end of their life spans. Many parts of the city are severely deficient in the number, extent and quality of plantings. Others are greatly in need of proper maintenance and support to deal with the unique challenges and stresses of the urban environment.

The urban forest contributes significantly to the amenity of the city and its desirability as a place to live, work and visit. Our city trees play a valuable role in the identity of the city and in reinforcing a sense of place. The urban forest provides an important social benefit, heightening the sensory experience of nature in the city—filtering light, adding color, providing needed shade, privacy and restoring the mental fatigue suffered by its residents and visitors. In addition to these qualitative benefits, our urban forest also performs important environmental functions such as removing 287 tons of atmospheric pollutants and 5,100 tons of carbon each year.

San Francisco's urban forest is owned and managed by a diverse mix of city, county, state and federal agencies as well as the private sector. On most streets, the property owner and the City and County of San Francisco share responsibility for trees. There has been little coordination in the care of trees among the parks, golf courses, streets and communities that form the bulk of the forest. Unfortunately, the public and elected officials have failed to fund urban forest activities at the level commensurate with its importance to the community.

The City's Urban Forestry Council, composed of citizens and professionals, recognizes that action must be taken to arrest the decline in the size of the urban forest, to regain lost ground and to rekindle the spirit of tree planting that occurred 100 years ago.

To that end, the Council has prepared an Urban Forest Plan, which reviews the creation of San Francisco's urban forest, analyzes the structure and functional benefits of the forests, and identifies the challenges that threaten its future. Designed to provide a road map for policy-makers and implementers, the Plan identifies five goals, critical to maximizing the value of the forest. Underlying these goals is the understanding that the urban forest is a living and evolving resource that is adapted to the unique and often challenging conditions of the urban environment. These goals are directed at the owners and managers of the trees that comprise the urban forest who must:

1. Maintain and conserve the existing urban forest.
2. Expand the urban forest through new planting.
3. Foster a shared set of values about the urban forest through education and action.
4. Manage the urban forest in a coordinated, responsible and effective manner.

5. Identify sustainable approaches for the funding and implementation of urban forest initiatives.

The Council believes that these goals are strongly related—one cannot simply be eliminated or ignored. All are critical to the future of San Francisco's urban forest. When these goals are implemented, the City will have more trees, a larger urban forest in better health with more trees evenly distributed and therefore providing a greater level of benefits.

Within these five goals are a diverse group of specific action items. The Council identified nine action items as having the highest, most immediate priority:

- Develop a set of best practices for tree selection, purchase, installation and care that include creative adaptations and establish high standards for all public and private projects.
- Protect the urban forest from and during the development process, on public and private property.
- Establish a goal of no net loss of trees. Where a tree is removed due to development whether public or private, the responsible party should be required to replace it in kind, either through new planting or fees.
- Institute a comprehensive reforestation program for aging stands in City parks and public institutions.
- Allocate and secure funding for planting and maintenance from public and private sources.
- Establish citywide goals for the urban forest and monitor results on an annual basis. Possible examples include providing one street tree for every five residents and raising the canopy coverage to 15%.
- Update the list of recommended trees, to reflect availability and horticultural advancements and consistent with the identity and local character of the city.
- Engage the leadership of the city to implement major tree planting programs targeting underserved neighborhoods in order to achieve greater environmental equity and accessibility.
- Engage the SF Unified School District, Parent Teacher Associations and community groups to develop tree programs at schools.

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"San Francisco's urban forest is comprised of all the trees and other vegetation found within city limits, a collected greenscape that provides environmental, economic, and social benefits for today and into the future."

San Francisco Urban Forestry Council, 2005

## I. Introduction

Thousands upon thousands of trees comprise San Francisco's urban forest. It is easy to acknowledge that Golden Gate Park and Stern Grove are part of the urban forest. But what about the trees in the middle of Van Ness Avenue? Yerba Buena Gardens? The eucalyptus groves at the Presidio? The stands of Monterey cypress that line the Olympic Club's golf courses? The palm trees that define the Embarcadero? The cherry trees in a backyard? They are all part of San Francisco's urban forest.

It is important to note that few of these trees are naturally occurring. Much of San Francisco's urban forest has its origins in planting efforts from the period 1865 to 1925. Almost all were planted by entrepreneurs, the military and citizens who recognized that San Francisco would be a better place if trees filled its parks and lined its streets. By planting trees, San Francisco would become a more livable, enjoyable city.

San Francisco's urban forest plays three major roles in the character of the City. First, it is part of the basic fabric of San Francisco. Without that forest, the City would be less welcoming, less inviting and less conducive to a good quality of life. What would San Francisco be like without Golden Gate Park? The trees along the streets and in parks are as much as part of the City's infrastructure as the streets themselves.

Second, the urban forest provides important economic and environmental benefits to the property owners and the community. It creates an environment where people can escape the intensity of urban life and be restored.

Third, outdoor recreation is intimately connected to the experience of the City's urban forest. There is growing evidence that the experience of nature in urban areas is restorative, reducing mental fatigue. This experience is directly associated with human health and well-being. The need for the experience of nature and its power of restoration is absolutely critical, as over 80% of Americans now live in urban areas.

Like San Francisco, many cities throughout North America recognize the importance of having a healthy and sustainable urban forest. As a result, they are investing in urban forest programs while examining the benefits and costs. The USDA Forest Service Center for Urban Forest Research has worked with a range of cities including Chicago, New York City, Seattle, Toronto, Minneapolis, Charlotte and Berkeley.

As part of a larger movement among cities to be active stewards of the urban forest, San Francisco is focusing on the sustainability of trees in the city. San Francisco has formally acknowledged the importance of the urban forest through the establishment of a tree advisory board, which is now the Urban Forestry Council. In 2005, Mayor Gavin Newsom signed the United Nations Urban Environmental Accords with an Urban Nature section that includes specific actions for urban forestry. Action 11 of the Urban Environmental Accords calls for measuring canopy cover, increasing canopy cover, and maintaining at least 50% of available street tree sites. Actions 10 and 12 are related to the community and wildlife benefits of urban forests. Furthermore, the Mayor's Office has launched the Livable Cities Initiative to achieve multiple city greening goals by 2010 and urban forestry is

cornerstone of this plan. As we reap the benefits sown by others, we must plan and create the forest that future generations will enjoy. We cannot be complacent about this responsibility—sustaining the urban forest requires commitment and action.

San Francisco's urban forest was created in a relatively brief period of intense tree planting that occurred almost 100 years ago. The mature trees of Golden Gate Park, the Presidio and other green spaces were planted during this time. Since that time, however, the urban forest has been shrinking in size. Meanwhile, the human population and the need for the benefits of trees have grown even as the stresses on trees have increased. Funding for management of public trees has been inadequate. Trees that have died due to old age and disease have not been replaced and planting in parks has not kept up with the losses. Trees on private lands have been removed during development. Trees along the street are removed but not always replaced. The life cycle of the most prominent species would indicate that replacement and replenishment must take place immediately.

The shrinking of San Francisco's urban forest must be halted and the trend reversed. Now is the critical time to reinvest in the urban forest. As San Francisco's population continues to grow and age, city trees are needed to mediate issues like air pollution, storm water runoff, and social stress. Furthermore, trees will help city dwellers adapt to global climate change and the likelihood of a warmer climate with more frequent storms. More trees are needed in throughout the City; existing trees need better care; and large stands of trees must be conserved and reforested.

No single owner or agency can reverse the loss of the urban forest and the work of planting and maintaining must be shared. In order to provide a framework for that effort, San Francisco's Urban Forest Council has taken a lead role. The Council believes that an **Urban Forest Plan** will guide the continued enhancement and evolution of the City's trees and green spaces.

This Plan is the result of a long history of concern for the City's urban forest. In 1992, Friends of the Urban Forest produced *The State of the Urban Forest*, a document that identified several key needs for the urban forest. A second *State of the Urban Forest* report was prepared in 2001. One of the key findings and recommendations was the need for coordinated effort among city department and agencies in managing the urban forest. In 2002, the City created the Urban Forest Council, a group of citizens assembled to advise city government, through the Department of the Environment, on how best to care for the urban forest.

In 1997, *The Sustainability Plan for the City of San Francisco* was prepared. This plan identified areas where resource depletion could be halted and resource restoration achieved. It wove together environmental, economic and social concerns, recognizing that a sustainable city required all three.

One of the *Plan's* main topics was **Parks, Open Spaces and Streetscapes**. In addition to filling the traditional roles of recreation and habitat, the *Sustainability Plan* noted that parks and open spaces were part of the "social fabric of the community and....a critical element in the economic development of the city." It recognized that these spaces must be created and maintained. Parks and open spaces do not arise spontaneously--they result from good planning and implementation. The recommendations for this section focused on creating new parks and open space, available to everyone in the City; enhancing existing streetscapes; and fostering planting of trees on private land. The *Sustainability Plan* also noted that increased funding and public participation were necessary to meet the goals.

The Urban Forest Council hopes to take the findings and recommendations of the *State of the Urban Forest* and *Sustainability Plan* to the next logical step: creating a standard reference document that

defines policies and procedures for urban forestry management in San Francisco. In doing so, the Urban Forestry Council will fulfill its mandate to create a comprehensive urban forest plan according to the ordinance that created the Council.[1] This Urban Forest Plan will serve many users, ranging from city departments and non-profit organizations to private companies that manage San Francisco's trees. The final plan will be distributed to all affected city agencies and available for other groups and the public. The Urban Forest Plan will be incorporated into the City and County of San Francisco's policy documents.

Four key statements are fundamental to forming the Plan:

1. San Francisco's urban forest is comprised of all the trees and other woody vegetation found within city limits, and is located on a mosaic of public and privately owned land. Many of the large-scale plantings are mature in character and have a limited life span.

2. San Francisco's urban forest provides important economic, environmental and social benefits to the City's residents, visitors, neighborhoods, and businesses.

3. San Francisco's urban forest requires active management. A passive approach of letting trees grow without care will ultimately doom the City's forest to deterioration. Sustaining the urban forest will involve the coordinated efforts of city agencies, non-government organizations, businesses and individuals.

4. San Francisco's urban forest is as much a part of the City's infrastructure as roads, bridges and tunnels. As such, the urban forest must be considered at all stages of planning and development. There is a clear need to raise community awareness about the urban forest as an integral part of the City.

The geographic breadth of the Urban Forest Plan will mirror the Scope of Authority granted to the Urban Forest Council in San Francisco's Administrative Code and Environmental Code and will be limited to the territorial boundaries of the City and County of San Francisco. To effectively address the whole of the urban forest, the Plan will address trees on both private (including residential backyards) and public property, as well as in parks and other large open spaces. The Plan will support efforts of organizations such as the Presidio Trust, University of California – San Francisco, and the Olympic Club in developing management plans specific to the their forests.

The scope of the Plan will be focused on trees, but policy recommendations will be informed by, and considered in relation to, the larger ecological context including wildlife management, air, water systems as well as other woody vegetation such as shrubs and median strip plantings.

**Organization of the Plan**
This Urban Forest Plan is divided into four sections.

1. A historical overview of the urban forest.

2. A description of the urban forest--its species composition, distribution and structure. This section also identifies the environmental benefits provided by the forest as a whole. It also focuses on the City's street tree population, analyzing both the costs associated with their installation and care, and the benefits provided by their presence.

[1] Environment Code Chapter 12

3. The identification of five goals that strive to take care of existing trees, plant new ones in needy areas, translate a love for San Francisco's trees into action, develop consistency of care and management and provide adequate, stable funding.

4. The final section identifies specific actions needed to implement the goals. In doing so, the City agency responsible to develop and implement the recommendations is identified.

## II. The Origins of San Francisco's Urban Forest

No forest existed prior to the European settlement of the city and the photographs and written records from that time illustrate a lack of trees. Previously, there was an Ohlone Indian population who used the native plant resource. Towards the Pacific Ocean, one saw vast dunes of sand, moving under the constant wind. While there were oaks and willows along creeks, San Francisco's urban forest had little or nothing in the way of native tree resources. The starting point for the urban forest was a treeless expanse of shrubs and low-growing plants.

The City's urban forest arose from a brief but intense period of afforestation, which created forests on land without tree cover. This period of planting, on public and private property began in the late 1800s and was essentially complete by 1925. Since that time, the public agencies and private landowners of the larger parcels of forest have enjoyed the benefits of those early tree planting efforts. Yerba Buena Gardens, Crissy Field, Justin Herman Plaza and the Embarcadero are relatively recent additions to the urban forest.

In the late 1860s, the City began reserving land for parks, with Hill Park (now Buena Vista) as the first parcel. By the 1870s, the vision of Golden Gate Park as a public pleasure ground was taking shape with the initial planting of trees taking place in 1872. Stern Grove had its origins about the same time, as the Greene family planted fast growing eucalyptus trees throughout the property. Private enterprise was establishing what would eventually become places like McLaren and Glen Parks.

It was also during this period that the Army, occupants of the northwest corner of the city, developed the area we know as the Presidio. By the end of 1892, some 350,000 trees were planted and over time the sandy dunes were transformed into mixed forest suited for multiple uses. About the same time, Adolph Sutro was making plans to establish areas of timber-production in the city, installing thousands of tree seedlings on Mount Parnassus (now Mount Sutro).

Early in the 1900s, several important golf courses including the Olympic Club, the San Francisco Golf Club, the California Club and Harding Park were established in the southwest section of the city. Within each course, thousands of trees were planted during construction.

The City's network of streets was established by the early 1900s. The idea of having trees along city streets was not seriously pursued until 1955, when a program of planting and care was established. In recent years, the City's Department of Public Works has teamed with non-profit organizations such as the Friends of the Urban Forest to plant new trees along streets.

More than a century after the first trees were installed, the framework of San Francisco's urban forest is still based on these initial plantings. At this time, the urban forest is owned and managed by a mix of public agencies and private groups (Table 1). At least a dozen City departments have some responsibility for trees and their care. Many agencies are independent of City and County government. They include local organizations such as the School District as well as state and federal agencies. A large number of trees are located on private property.

The fact that many stakeholders take care of the urban forest presents a significant challenge to long-term management. Organization priorities and missions vary widely while state and federal agencies are exempt from municipal tree ordinances. There is, however, a compelling need for cooperative effort and clarity of purpose. Most San Franciscans would agree that the urban forest is an asset to the community. The challenge of finding a comprehensive vision to manage this resource is a critical one, central to the success of any plan, and must involve a wide range of stakeholders with various priorities and viewpoints.

The origin of the City's urban forest can be traced to a single burst of public and private tree planting during a 50-year period, almost a century ago. Trees do not live forever and unless the existing trees receive continued care, they will age and die at an increasing rate. Even if they receive care, all of the trees that comprise the urban forest will eventually die. The fact that many trees are approaching 100 years of age makes the need for replacement and replenishment even more urgent.

Unless more trees are planted, the urban forest will become smaller since nature will not replace these losses. New parks, street tree plantings, and green spaces must be established to ensure the urban forest benefits all San Franciscans.

## Table 1. Owners and managers of significant portions of San Francisco's urban forest

| | |
|---|---|
| **City and County of San Francisco Agencies** | |
| Bureau of Urban Forestry-<br>Department of Public Works | Implements Urban Forestry Ordinance (Article 16) of Public Works Code:<br>street trees, landscaped medians, sidewalk repair, education & outreach. Works in conjunction with non-profit groups to plant new trees. |
| Recreation & Park Department | Manages 3,000 acres with an estimated 100,000 trees, in parks, natural areas, golf courses, and watersheds. Sites include Golden Gate Park, Gleneagles & Harding Park golf courses, and Stern Grove. |
| SF Housing Authority | Responsible for trees within public housing. |
| SF Public Utilities Commission | Manages trees and vegetation in relation to public water reservoirs in and around San Francisco. |
| Port of San Francisco | Responsible for trees and woody vegetation related to the Port. |
| SF Municipal Railway (MUNI) | Responsible for trees that may encroach on overhead conductors, through State of California General Order 95. |
| San Francisco International Airport | Responsible for trees and woody vegetation within its facilities. |
| **State Agencies** | |
| University of California, San Francisco | Responsible for trees and woody vegetation within its facilities including the Mount Sutro Open Space Reserve. |
| San Francisco State University | Responsible for trees and woody vegetation within its facilities. |
| SF Redevelopment Agency | Responsible for planning, planting, managing, maintaining and overseeing the management of trees within its projects, constituting several thousand acres and including large open spaces, parks, and streetscapes. |
| SF Unified School District | Responsible for trees within school facilities. |
| **Federal Agencies** | |
| U.S. Department of the Interior-<br>National Park Service | Golden Gate National Recreation Area (GGNRA). Responsible for coastal<br>sections of the Presidio as well as Fort Mason, Lands End and Fort Funston. |
| The Presidio Trust | A public-private partnership responsible for the management of the Presidio's forest. |
| **Private Properties** | |
| The Olympic Club | Responsible for trees and woody vegetation within its facilities. |
| The San Francisco Golf Club | Responsible for trees and woody vegetation within its facilities. |

## III. The Structure and Function of the Urban Forest

Most San Franciscans readily acknowledge that the urban forest makes the City a nicer place to live. They appreciate the beauty of parks, gardens and the trees along city streets. However, the management of the urban forest presents many challenges that may not be apparent to the average person.

Many resource managers in San Francisco have lacked specific knowledge as to the number and location of trees under their care. The Department of Public Works (DPW) is the exception, having a decade-long work history. Even with such information, DPW has lacked a quantitative understanding of the functional roles that street trees play in the community until recently. Through collaboration with the United States Department of Agriculture (USDA) Forest Service, San Francisco now has a better understanding of its street tree and total tree population. As a result, there is quantitative information on tree population, age distribution, tree species, tree condition and associated benefits on canopy cover, environmental benefits and costs.

### *The Nature of the Urban Forest*

In 2004, the San Francisco Urban Forest Council invited a research team from the United States Department of Agriculture Forest Service to study San Francisco's urban forest. The team's report, issued in early 2005[2], was the first comprehensive analysis of San Francisco's urban forest, that is, all of the trees growing within the city limits.[3] The project employed the Urban Forest Effects Model (UFORE), a comprehensive tool that assesses the structure and function of a community's urban forest.

The Department of the Environment followed an established protocol and collected field data from 200 randomly selected ground plots throughout San Francisco. This data was forwarded to the USDA Northeastern Research Center where David Nowak and his research team analyzed the data with a computer model (UFORE) to understand San Francisco's entire urban forest.

Since the area was once grasslands and riparian habitat, San Francisco has negligible native tree resources, although some oak and willow trees are native to the area. The species that comprise the urban forest today are not native to the City. The USDA Forest Service reported that there are 668,000 trees represented by over 100 different species in San Francisco. Tasmanian blue gum is the most common type of tree with over 100,000 trees present. Monterey pine (56,000), Monterey cypress (25,000), and glossy privet (21,000) are also common. Five species of the genus *Pittosporum* comprise another 85,000. The first three species dominate the city's large green spaces such as the Presidio, Mount Sutro and Golden Gate Park. Karo (*Pittosporum crassifolium*) and Chinese privet (*Ligustrum lucidum*) are commonly found as street and landscape trees.

The urban forest is very fragmented with the exception of parks and natural areas in the north and western edges of the city. A GIS map of San Francisco indicates that several large parks and many small parks are scattered throughout the city (Figure 1).

The UFORE study calculated the surface area covered by tree canopies in San Francisco. Almost half (43%) of San Francisco's land area is covered by streets, sidewalks and other forms of pavement. Another 26% is occupied by buildings and will likely not be available for planting trees and other

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[2] USDA Forest Service. September 2005 (draft). Assessing Urban Forest Effects & Values. USDA Forest Service. Northeastern Research Station. Syracuse NY. General Technical Report. 22pp.

[3] For a detailed discussion of the methods and models used in the study, refer to the following paper: http://www.fs.fed.us/ne/syracuse/Pubs/Downloads/gtrne290.pdf.

vegetation. The urban forest canopy covers approximately 12% of the San Francisco. This compares to 10% in Los Angeles, 27% in New York City, 28% in Chicago and 34% in Seattle. This measurement of San Francisco's tree canopy cover satisfies Article 11 of the Urban Environmental Accords.

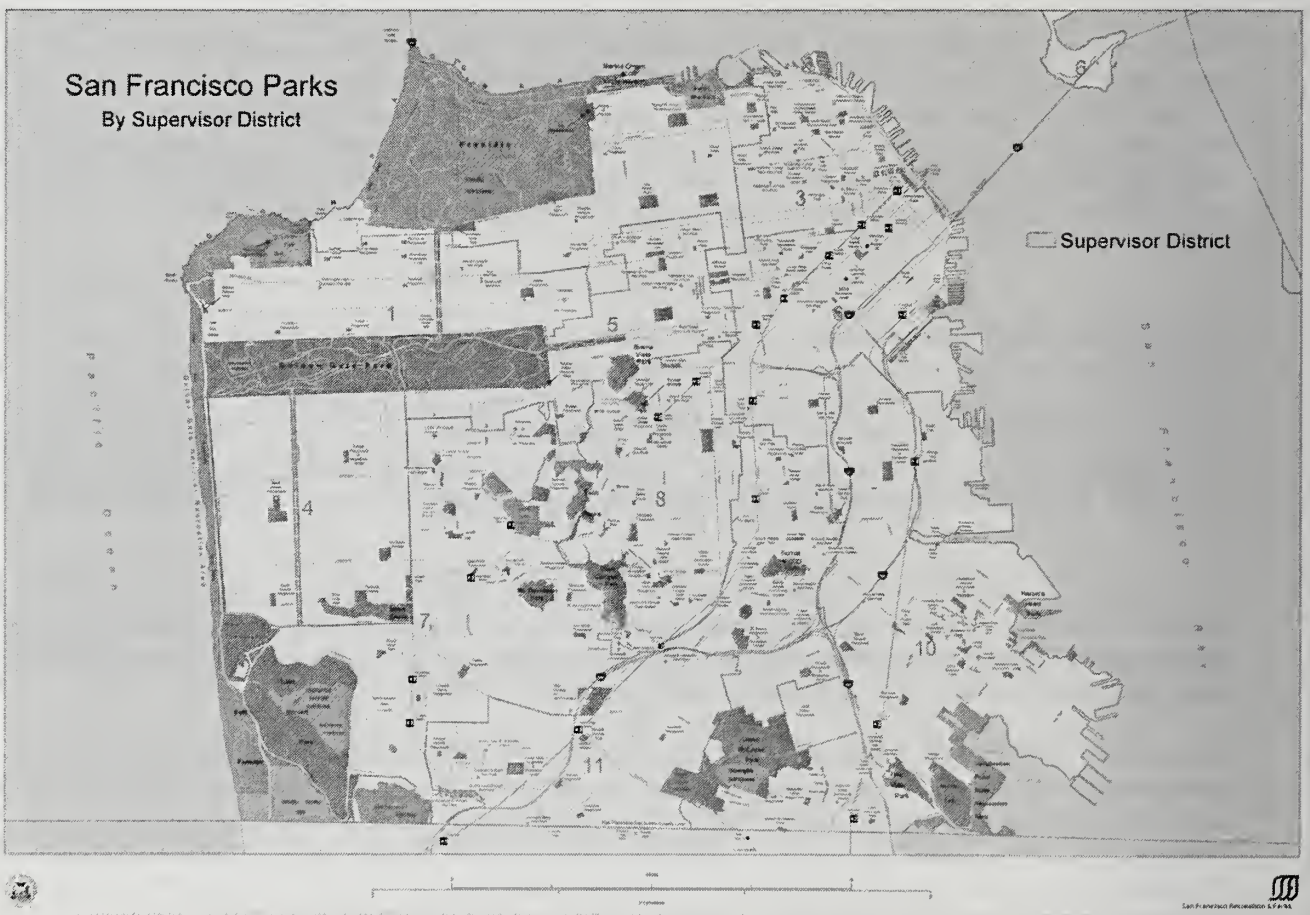


**Figure 1. Overview of parks and natural areas in San Francisco**

**Sources of information**
Stasio, S. 2005. San Francisco Parks by Supervisor District Map. Department of Recreation and Park.

The structure of the urban forest in several other U.S. cities has also been analyzed by the Forest Service team and the UFORE model (Table 2). With a human population of 764,069 and an urban forest of 668,000 total trees in San Francisco, there is approximately 1 tree per citizen (0.87). This falls into the mid-range of cities with UFORE analysis, where the low was Brooklyn, NY (0.25 trees/citizen) and the high was Baltimore, MD (3.0 trees/citizen). Another way to compare these cities is looking at the number of trees per square mile and the number of people per square mile. Among the seven cities in Table 2, places with higher population density have lower tree density per square mile. An exception occurs when comparing San Francisco and Jersey City. Despite having a higher

population density per square mile than Jersey City, San Francisco has 5000 more trees per square mile. This is a simple comparison between San Francisco and large cities throughout the United States with different conditions such as climate, land use and demography; thus, it is important not to make assumptions about future tree density trends in San Francisco or other cities based on Table 2.

As the trees in the urban forest grow, they *remove contaminants from the atmosphere*. The UFORE report found that each year, over 287 tons of ozone, particulates, nitrous oxides, sulfur dioxide and carbon monoxide are taken out of the air by the action of the urban forest. The value of this *environmental benefit is $1.3 million per year*. In addition, San Francisco's trees remove 5,100 tons of carbon from the atmosphere and store approximately 194,000 tons as biomass. A reduction in air pollution benefits everyone, particularly people with asthma and other respiratory health problems.

While the USDA Forest Service described and quantified some functions of the urban forest, the UFORE study did not capture all the benefits of trees. Besides mitigating air pollution, trees provide numerous public health benefits. The leafy canopy of trees reduces ambient temperature and provides natural shade. Trees not only cool their surrounding area, they also reduce ultraviolet radiation (UV) and the risk of skin cancer.[4]

As importantly, there are a number of studies verifying the immense value of urban forests to the social well-being of people. The simple presence of *forests, trees and other vegetation helps people recover from mental fatigue*, leading to a reduction in socially unacceptable behavior and crime.[5] Children exposed to outdoor green space exhibit fewer behavioral problems like Attention Deficit Disorder and a greater ability to concentrate.[6]

Furthermore, trees can reduce energy demand and consumption. Trees reduce ambient temperatures and wind speed, which results in energy savings for cooling and heating.[7] At present San Francisco has a cool and temperate climate. However, as temperatures rise due to global climate change, energy demand and costs will likely increase as well. Having a healthy and robust urban forest is one strategy to mitigate climate change.

As well as offering benefits to humans, urban forests provide *habitat for wildlife*. Birds, butterflies and insects may be the most visible indicators of this function. Yet we know that even an urban area like San Francisco is home to mammals such as coyote, fox and skunk. In addition, a wide range of reptiles and amphibians are present. These organisms face many challenges to their survival including habitat fragmentation and loss, traffic, domestic pets and human activities. Connecting and expanding green space in San Francisco will improve conditions for wildlife.

There are numerous opportunities throughout San Francisco to maintain and enhance the urban forest particularly within public parks and institutions. There are many stakeholders in this effort such as the Department of Recreation and Park, San Francisco Public Utilities Commission, Laguna Honda Hospital, Department of Public Works and Friends of the Urban Forest.

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[4] Purdue News. April 2002. Researchers say trees could affect land use, reduce skin cancer. http://www.purdue.edu/UNS/html4ever/020422.Grant.shade.html

[5] Kuo, F. E, Sullivan, W.C. 2001. Environment and crime in the inner city: does vegetation reduce crime? *Environment and Behavior*, (33) 3: 343-367.

[6] Taylor, A.F., Kuo, F.E. and W.C. Sullivan. 2001. Coping With ADD: The Surprising Connection to Green Play Settings, Environment and Behavior (33)1: 54-77.

[7] Geiger, J.R. 2001. Save dollars with shade. Center for Urban Forest Research, Pacific Southwest Research Station, USDA Forest Service. 4 pg.

**Table 2. Ratio of trees to population in U.S. cities analyzed using the UFORE model**

| City | Population | Number of Trees | City area square mi | People/ square mi | Trees/ square mi | Trees/ person |
|---|---|---|---|---|---|---|
| Brooklyn, NY | 2,465,326 | 610,000 | 81.8 | 30,138 | 7,457 | 0.25 |
| Jersey City, NJ | 228,537 | 136,040 | 14.9 | 15,338 | 9,130 | 0.60 |
| San Francisco, CA | 776,733 | 668,000 | 46.7 | 15,936 | 14,304 | 0.87 |
| Philadelphia, PA | 1,585,577 | 2,112,619 | 135.1 | 11,736 | 15,637 | 1.33 |
| Chicago, IL | 2,783,726 | 4,100,000 | 227.1 | 12,257 | 18,053 | 1.47 |
| Boston, MA | 574,283 | 1,183,451 | 48.4 | 11,865 | 24,451 | 2.06 |
| Balitmore, MD | 651,154 | 2,210,200 | 80.8 | 7,874 | 27,354 | 3.39 |

**Sources for population data**
Baltimore, Brooklyn, San Francisco: United States Census 2000 data.
Boston, Chicago, Jersey City, Philadelphia: United States Census 1990 data.

**Sources for city land area data**
McGeveran Jr, W.A. (ed.). The World Almanac and Book of Facts 2006. World Almanac Books: New York. 1008 pg.
Jersey City http://www.cityofjerseycity.com/about.html
Brooklyn http://www.nyc.gov/html/dcp/pdf/lucds/brooklynprofile.pdf

| Sources for tree data | City |
|---|---|
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The Department of Recreation and Park manages 3,480 acres and 209 parks, which provide habitat for trees. Implementation of Recreation and Park's existing forest management plans would result in improvements to the urban forest. Within Recreation and Park, the Natural Areas Division manages a smaller area (860 acres within 31 parks) and focuses on habitat restoration for native plants and animals. Another opportunity is the San Francisco Public Utilities Commission (PUC) Alameda Watershed Plan. The primary objective of this plan is to ensure a sustainable supply of clean water for the present population and future generations of San Francisco. A focus on planting and maintaining the urban forest on PUC land would complement the vegetation management goals in the Alameda Watershed Plan. Furthermore, public institutions such as Laguna Honda Hospital are interested in establishing more trees but they need resources. The role of the Department of Public Works and Friends of the Urban Forest will be discussed in detail in the next section.

In summary, each year trees in San Francisco are planted and removed. Because the City has no native forest, there is little natural regeneration. For this reason, maintaining the current forest of 668,000 trees requires that planting keep pace with tree removal. There is no information on a citywide level as to whether or not this is occurring.

***The Forest along the Streets***

Streets and public rights-of-way comprise the most significant opportunity for planting within the city. But although one-quarter of the city (almost 8,000 acres of land) is devoted to these public spaces, they are underplanted and existing trees are not linked to a larger and coherent community. Unlike trees in parks and backyard areas, street trees struggle with even more urban stresses, in particular, soil compaction and paved surfaces that restrict root and tree growth. At the same time, the urban street tree, more than any other element in the city landscape, can most effectively mediate due to its proximity, the environmental impacts of vehicular exhaust, noise, urban run-off and pollution.

The capacity of streets to grow trees is often compromised by other demands like vehicular traffic. A static approach to street design must be replaced by a new attitude that envisions the urban forest as an integral part of the infrastructure of the street, as important to and fundamentally tied to a much broader and diverse vision, related to all modes of movement and imparting a sense of scale and identity that makes urban environments more humane and livable. In some cases, street plantings have failed—for various reasons—and now need to be replaced. The Market Street plantings of London plane trees (*Platanus x acerifolia*) are a case in point. Rather than creating an intentional ribbon of green that would underscore the importance of this street in the city, the trees along Market are stunted and contorted and appear abused, which they are. In these cases, major new street tree plantings should be undertaken as part of rethinking a broader role for the street itself.

Within the public right-of-way along San Francisco's streets are approximately 106,000 trees, or 16% of the City's 668,000 tree urban forest.[8] Street trees, defined by location, illustrate the diversity of ownership and management of the urban forest. The Department of Public Works (DPW) maintains about 26,000 trees, primarily located along boulevards and arterials. Property owners maintain another 80,000 trees, primarily in residential settings.

San Francisco's street trees are not evenly distributed across the city (Table 3). Street tree populations, both publicly and privately maintained, range from 3,723 trees in District 3 (North Beach) to 12,898 in District 5 (Western Addition). Most of the street trees in District 4 (Sunset) are managed

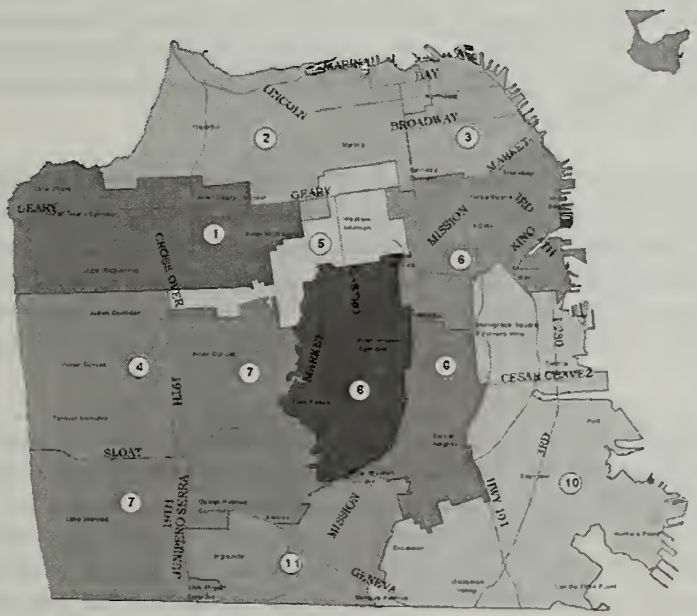
[8] Maco, S., E. G. McPherson, J. Simpson, P. Peper and Q. Xiao. 2003. City of San Francisco. Street Tree Analysis. USDA Forest Service. Pacific Southwest Research Station. Davis CA. 117pp.

by the property owner. In District 5 street tree management is more evenly divided between DPW and private management.

**Table 3. San Francisco's Street Tree Population by Supervisory District**

| District | | Number of Trees DPW | Private/Public* | Total | % of Total |
|---|---|---|---|---|---|
| 1 | Richmond | 2,041 | 3,604 | 5,645 | 5.3% |
| 2 | Marina | 1,076 | 7,160 | 8,236 | 7.7% |
| 3 | North Beach | 999 | 2,724 | 3,723 | 3.5% |
| 4 | Sunset | 1,453 | 7,115 | 8,568 | 8.0% |
| 5 | Western Addition | 6,151 | 6,747 | 12,898 | 12.1% |
| 6 | South of Market area | 1,559 | 9,421 | 10,980 | 10.3% |
| 7 | Merced | 2,317 | 8,677 | 10,994 | 10.3% |
| 8 | Castro/Noe | 1,772 | 12,636 | 14,408 | 13.5% |
| 9 | Mission/Bernal | 3,352 | 9,063 | 12,415 | 11.6% |
| 10 | Potrero/Bayview/HP | 4,073 | 8,438 | 12,511 | 11.7% |
| 11 | Excelsior/Outer Mission | 1,696 | 4,714 | 6,410 | 6.0% |
| | **Total** | **26,490** | **80,299** | **106,789** | |

*Private/Public denotes street trees that are publicly owned but managed by private individuals and/or property owners.

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Rodgers, A. 2005. San Francisco District map. Planning Department.

Another way of comprehending the number of street trees is to compare them with the people and streets that naturally border them. With 106,000 street trees and a human population of 776,733, there are approximately seven San Franciscans for each street tree (Table 4). Across districts, the number of residents per tree ranges from 4.8 in District 8 (Castro/Noe) to 18.9 in District 2 (North Beach). Comparing the number of street trees of the miles of streets is another way to visualize and comprehend street trees in San Francisco. The citywide average is 113 trees per mile of street. However, there is great variation in the number of street trees per mile among districts. The number of street trees per mile of street range from 209 trees per mile in District 5 (Western Addition) to 66 in District 2 (North Beach). The citywide average is 113 trees per mile of street.

These numbers are brief summaries of street tree populations that permit simple comparison between neighborhoods in San Francisco; they are not intended to explain the multiple factors that contribute to the variation in street tree population and condition.

Looking at the ratio of residents to each street tree is a common standard of comparison between cities. With seven residents for each street tree, San Francisco was at the low end of 22 cities whose street tree populations were studied by the United States Department of Agriculture Forest Service. Los Angeles, Eugene, OR and Syracuse, NY all have one street tree for every five residents.

The San Francisco street tree population and ratio to residents lags behind other cities for many reasons. In a majority of residential areas, the property owner is required to pay for street tree planting and maintenance, which can be a barrier especially to lower income residents. By contrast some cities provide street trees and limited maintenance for free. Residents may also have cultural preferences that make tree planting less desirable.

Besides social considerations, there are physical obstacles to planting and tending healthy street trees. Street and sidewalk infrastructure makes it difficult to plant trees. Furthermore, overhead wires, utility undergrounding and paved surfaces are often prioritized before trees. Often the paved area of the street is far more extensive than is needed to perform the necessary functions and creative approaches can accomplish larger goals for reclaiming space for pedestrians and bicyclists and creating streets that are calmer and designed to be more supportive of the neighborhoods and districts around them.

A tremendous opportunity exists to take advantage of lost space within the city and dramatically expand the urban forest through the conversion of pavement into healthy soil and permeable surfaces capable of supporting the urban forest. One opportunity is transforming public rights-of- way. A public right-of-way is an area affiliated with alleys, boulevards, courts, lanes, roads, sidewalks, spaces, streets, unaccepted streets and ways within San Francisco under the jurisdiction of the Department of Public Works. Common examples include medians, sidewalks, triangles and unaccepted streets. The DPW Street Parks Program helps community members transform public rights-of-way into open spaces with landscaping and other amenities. For example, the San Jose/Guerrero Coalition to Save Our Trees transformed street medians with trees, shrubs and plants, while the Quesada Gardens Initiative established a community garden in Bayview/Hunters Point, which includes trees.

These efforts compliment Traffic Calming Program Guidelines developed by the Department of Parking and Transportation (DPT). Within the guidelines, there are opportunities to incorporate street trees. About 50% of the program's projects incorporate trees, shrubs, rocks, drought tolerant plants and limited irrigation and proposed median islands would incorporate trees. Also, DPT is currently working on the San Francisco Pedestrian Plan, which is another way to promote street trees and their numerous benefits.

In addition, there are over 127,000 empty planting sites present along City streets. Most (98%) of these are void space, locations where no planting basin currently exists. Installing a tree in those spaces requires cutting the existing pavement and creating a new planting basin. About 5,000 spaces are existing basins that simply lack a tree. However, some existing and potential basins may be unsuitable for tree planting due to considerations like accessibility for the disabled, utilities, driveways and curb cuts.

As with the trees themselves, potential planting spaces are not evenly spread across the city. For example, less than 30% of the potential planting spaces in Districts 4 and 11 are planted with trees whereas over 70% in Districts 5 and 8 have trees (Table 4).

A great opportunity exists to enhance San Francisco's street tree population by simply planting within the existing street system. There are more potential planting spaces in San Francisco (127,500) than are currently occupied by a street tree (106,000). In theory, the street tree population could be doubled by simply planting in the vacant spaces. However, the actual number of potential planting spaces is less than 127,500 due to the presence of underground utilities, view sheds and proximity to related infrastructure. Given that the distribution of trees across the city is uneven, new trees could be installed in neighborhoods with fewer street trees.

In response to this opportunity, the Urban Forest Council has written a Street Tree Action Plan that includes planting, maintenance and funding goals.[9] The stated target of planting 5,000 new trees each year will place 100,000 additional streets trees over 20 years. The Mayor's Office is leading the implementation of this plan, which supports Article 11 of the United Nations Urban Environmental Accords.

Among the 106,000 street trees in the city, the most common species are small- and medium-sized species: Victorian box, Indian laurel, New Zealand Christmas tree and plum. Large tree species such as blue gum, Monterey pine and Monterey cypress, while common in the open space areas, are present only in small numbers. It is important to plant the largest tree possible for each planting site whenever possible. In some cases there is not enough space, either above- or below-ground, for large trees along city streets.

Citywide, 60% of the street trees are in good condition, 30% in fair and 10% in poor condition or dead. Tree condition varies across the city due to species selection, growing conditions and ongoing care and maintenance. In District 6 (SOMA) for example, 85% of the private trees are in good condition while in Districts 3 (North Beach) and 11 (Excelsior/Outer Mission), only 27% and 25% are. Given the variation in economic development across the supervisorial districts, it is not surprising that trees managed by private property owners vary in condition. It is surprising that the same pattern occurs in publicly managed street trees. Few public trees in District 10 (Potrero/Bayview/Hunters Point) are in good condition, while 76% in District 11 (Excelsior/Outer Mission) are in good condition.

[9] Urban Forestry Council. November 2004. Enhancing San Francisco's Neighborhoods: *A Proposed Street Tree Action Plan.* 4 pp.

**Table 4. San Francisco's Street Tree Population: Distribution by Supervisory District**

| | District | No. residents per tree | No. trees per street mile | Filled planting space (%) |
|---|---|---|---|---|
| 1 | Richmond | 12.4 | 79.0 | 48 |
| 2 | Marina | 8.1 | 110.5 | 67 |
| 3 | North Beach | 18.9 | 66.2 | 39 |
| 4 | Sunset | 8.2 | 93.8 | 26 |
| 5 | Western Addition | 5.6 | 208.9 | 72 |
| 6 | South of Market area | 6.4 | 136.9 | 42 |
| 7 | Merced | 6.3 | 76.9 | 32 |
| 8 | Castro/Noe | 4.8 | 146.1 | 71 |
| 9 | Mission/Bernal | 5.7 | 184.1 | 62 |
| 10 | Potrero/Bayview/HP | 5.2 | 110.8 | 34 |
| 11 | Excelsior/Outer Mission | 7.9 | 74.5 | 29 |
| | **Total** | **7.0** | **112.8** | **44** |

**Sources of information**

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Maco et al. 2003. City of San Francisco Street Tree Analysis. USDA Forest Service Pacific Southwest Research Station, Davis CA.

Rodgers, A. 2005. San Francisco District map. Planning Department.

Street tree survival varies depends on many factors such as location, maintenance and community involvement. Since 1987, over 38,000 street trees have been planted by the Friends of the Urban Forest (FUF), the City's foremost non-profit tree organization.[10] A survey of trees planted by FUF has shown that almost 90% of trees were alive 36 months after planting and over two-thirds were alive 10 years after planting. There were important species and location differences in tree survival and growth, information that helps FUF enhance the growth and performance of new plantings. Residents of the Castro/Eureka Valley areas can take pride that over 90% of trees were alive after 10 years.[11] A national study on community based urban forestry projects confirms the effectiveness of Friends of the Urban Forest and similar organizations.[12]

On the other hand, the Department of Public Works has internal departmental data on street tree mortality. For street trees managed by DPW, the estimated mortality rate is 5% within five years after planting. Then the estimated mortality rate drops to 1.5% after five years.[13]

There is no comparable study or data set for street trees managed by property owners without assistance from Friends of the Urban Forest or DPW.

Common objections to street trees are potential conflicts with pavement and utility lines. However, in San Francisco there are relatively few conflicts between trees and these types of infrastructure. Only 15% of street trees have displaced pavement more than 0.5 inches. Although the vast majority of street trees are located beneath overhead utilities, only about 10% have been topped to provide clearance. Both of these conflicts may become more significant in the future as young trees enlarge in size. In order to ensure tree growth and health above and below ground, infrastructure improvements are necessary.

In 2003, the Urban Forest Council asked a team of scientists from the USDA Forest Service's research unit in Davis, California to calculate the costs and benefits provided by the City's street trees.[14] The Forest Service team worked in cooperation with Friends of the Urban Forest and Department of Public Works to survey the street tree population. Subsequently, the Forest Service analyzed the cost of managing 26,490 trees maintained by DPW, and evaluated the benefits provided by the trees to the city.

Street trees managed by DPW:

- Have an annual maintenance cost of $4.77 million, based an operating budget of $3.43 million and $1.35 million spent by other departments on street trees. The largest expenditures involve tree pruning ($2.26 million) and litigation costs ($1.08 million).
- Provide the city with $7.5 million in annual benefits including property value increases which account for $6.9 million per year of this total.
- Provide $467,000 per year in controlling storm water runoff.
- Provide savings of $85,000 in energy costs (heating & cooling) to adjacent properties.

On balance, the benefits provided by city-managed street trees equal the costs associated with their care. The Street Tree Action Plan provides goals and a budget to increase the quantity and quality of street trees in San Francisco.

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[10] Website for Friends of the Urban Forest: www.fuf.net.
[11] Sullivan, M.J. 2004. Survey of 5 and 10 year Old Trees Planted by FUF. Available at www.sftrees.com.
[12] Bond, J. October 2005. The Significance of Young Urban Tree Mortality on State Implementation Plan (SIP) Planning. Urban Tree Canopy Cover Inclusion in State Implementation Plans.
[13] Department of Public Works. 2005. Street Tree Mortality Estimates.
[14] Maco, S., E. G. McPherson, J. Simpson, P. Peper and Q. Xiao. September 2003. City of San Francisco California – Street Tree Analysis. USDA Forest Service. Pacific Southwest Research Station. Davis CA. 117pp.

***San Francisco's Urban Forest as seen by the Community***

In early 2005, the Urban Forest Council asked 1,100 residents, 100 in each of the 11 Supervisory Districts, to comment on their feelings and attitudes about the City's urban forest.[15] Overall, residents were satisfied with the quantity and quality of trees in the city, and were somewhat more satisfied with parks than with the trees on the street where they live.

Across San Francisco, the level of satisfaction with the quality and quantity of street trees varied. At one end of the scale, just over 70% of the people in District 7 were satisfied with the trees on the streets where they live. In contrast, only 44% and 45% of respondents in Districts 11 and 6 shared this view. The satisfaction levels in other Districts range within these numbers. There did not appear to be a relationship between number of trees in a District and overall satisfaction.

Most San Franciscans (62%) believed that city government and its agencies should be responsible for planting and caring for trees along city streets. A majority supported increasing the parcel tax in order that the government might provide these services. Property owners, however, are opposed to such a tax. Twenty-five percent (25%) of San Franciscans have installed a tree outside their home or apartment, and another 25% have considered doing so.

San Franciscans recognize the unique character and qualities of rare and very old trees. About two-thirds supported legislation that would prohibit their removal, even on private property.

***Summary: The Current State of San Francisco's Urban Forest***

San Francisco's urban forest consists of **668,000 trees** located in 1) a small number of large parcels, 2) along city streets, and 3) a large number of small parcels. Estimates are that **over 200,000 trees are found in open space**s such as the Presidio and Golden Gate Park. Ownership of these parcels includes state, federal and municipal agencies as well as private landholders.

The majority of the **106,000 street trees** are in good condition. Trees along city streets are generally smaller in size than those found in parks. The ratio of the City's population to street trees is about 7:1, which is below that of other cities. The Street Tree Action Plan provides a blueprint for increasing the quantity and quality of street trees. Street tree management is shared by the City and private property owners.

The remaining **368,000 trees that comprise the urban forest are found on residential properties, within commercial and industrial areas, and as part of the landscapes of institutions** such as hospitals and universities.

Taken together, the canopy of the 668,000 trees covers 12% of San Francisco's land area. This forest removes contaminants from the atmosphere, reduces storm water runoff, provides wildlife habitat, and enhances property values.

San Franciscans value the City's urban forest. Most residents are satisfied with the park system and value its presence. A majority are satisfied with the trees on the street where they live. One in four has planted a tree! A majority of San Franciscans want City government to take a leadership role in managing the urban forest.

[15] Research was performed by David Binder Research and included 100 voters in each of the eleven Districts.

## IV. A Plan for the Future of San Francisco's Urban Forest

San Francisco historically lacked a natural forest resource. The existing forest is the result of determined human efforts at planting and maintenance. If the forest is going to be sustained in the future, the same committed effort is needed. San Francisco's urban forest cannot maintain itself let alone expand itself. Citizens, government agencies, corporations and organizations need to establish, care for and maintain it.

***Goal 1. Maintain and conserve the existing urban forest.***

San Francisco's urban forest is a unique assemblage of diverse species, bringing together trees from all over the world. Many of the large groups of trees, most notably in the Presidio, Golden Gate Park, and Mount Sutro, are mature and are reaching the end of their life spans, with greater susceptibility to disease and windthrow. The number of trees in these areas is declining and the possibility of huge losses during episodes of drought, high winds and storms or to disease continues to increase over time. The 1998 Golden Gate Park Master Plan estimated that 30 to 40% of the trees in the park would be lost in the next 20 years. Over the period 1980 to 1993, the tree population in the park declined by over 6,000 trees (19% of the total in the Park). The Plan noted, "Park forest will continue to decline through natural aging process."

The partnership between the Department of Public Works and Friends of the Urban Forest has resulted in thousands of trees being planted along city streets. There has not been, however, a plan to address maintenance of these trees as they become mature. At this time, the burden for care falls to the property owner.

The parks and street plantings are significant contributors to the city's livability and a concerted effort must be made to maintain and conserve them. Otherwise, trees will decline and die sooner rather than later. Several specific actions are needed to maintain and sustain this valuable resource:

- City of San Francisco departments and agencies that manage trees should establish a state of the art stewardship program that addresses the full lifecycle of trees within the urban forest and the appropriate strategies and approaches required for best management of the resource. Within 5 years, the Department of Public Works and Recreation and Park Department should replace the current "pruning by request" effort with a program of scheduled maintenance for all trees.
- The City of San Francisco should incorporate an urban forest component into the city's general plan.
- The City of San Francisco should enact legislative tools and public policies that protect existing trees on public and private property and provide consistent enforcement.
- City departments should prepare management plans for the trees and parks they manage. Agencies outside city government should be encouraged to do the same.
- The City of San Francisco should establish a goal of no net loss of trees. Where a tree is removed due to development, whether public or private, the responsible party should be required to replace its value, either through new planting or fees.
- The Recreation and Park Department should institute a more aggressive reforestation program in City parks.
- City departments should expand programs of habitat restoration, particularly in remnant patches of pre-settlement vegetation.
- The Public Utilities Commission should cultivate trees and vegetation and link their open space with other areas in San Francisco and the Bay Area as part of the Alameda Watershed Management Plan.

***Goal 2. Expand the urban forest through new planting.***
San Francisco's urban forest is not evenly distributed across the city. Some neighborhoods and communities have fewer, smaller and less healthy trees than others and they receive fewer benefits from trees. To provide the benefits of trees to all residents, street and park tree management programs must be expanded into underserved areas. Given the economically disadvantaged condition of some districts, the City and its partners need to take leadership in urban forest management. One possibility is that the City's Department of Public Works can expand the number of streets along which it maintains trees.

Before the Department of Public Works can plant new street trees, the existing street tree program must be strengthened. New trees must be planted to replace trees that were previously removed from existing plantings and opportunities for new plantings need to be realized along with restructuring of streets and other public spaces. Public Works acknowledges that new trees have not been planted at a rate equal to their removal. In addition, capital improvement projects remove trees without associated replacement. A similar situation exists in other City departments like Recreation and Park.

- The City of San Francisco should establish a goal to raise canopy cover from 12% to 15% in the next 10 years.
- The City should ensure that street design and redesign projects include trees.
- The Department of Public Works should establish a goal of one street tree for every 5 residents. Current levels are one tree for every 7 residents. A street tree for every 5 residents would place San Francisco at the average ratio for cities of comparable size.
- The Department of Public Works should establish a goal that 85% of planting spaces should be planted. This should occur in all districts, as recommended in the Urban Forest Council's Street Tree Action Plan.
- The Department of the Environment, using the results of the Friends of the Urban Forest's study of tree planting, should coordinate an update of the recommended species selection lists. This update should become the citywide approved list for use by all City departments.
- The Department of Public Works should investigate improvements for street tree planting such as larger tree basins, tree trenches, and structural soil.
- The Department of Public Works, the Recreation and Park Department and the Redevelopment Agency and other City departments should work in concert with neighborhood and community groups in areas with smaller tree populations to initiate street and park tree plantings such as North Beach, Sunset, Merced, Potrero Hill, Bayview/Hunters Point, and Excelsior/Outer Mission districts.
- The Department of the Environment should engage the SF Unified School District and associated parent-faculty groups at local schools to develop a tree planting and maintenance program.
- City departments should initiate tree planting programs at municipal facilities in the North Beach, Sunset, Merced, Potrero Hill, Bayview/Hunters Point, and Excelsior/Outer Mission districts.
- The Department of Public Works and Planning Department should prioritize key streets with potential for linking the city that can become corridors for planting.
- The Planning Department and Redevelopment Agency should upgrade and expand tree planting and landscape requirements in new projects.

***Goal 3. Foster a shared set of values about the urban forest through education and action.***
Few residents and fewer visitors would argue that San Francisco would be a better place without its urban forest. The trees that comprise the urban forest make the City a more livable, enjoyable and

desirable place. The fact that 75% of San Franciscans are satisfied with the City's urban forest reflects this observation. The challenge lies in translating that sense of satisfaction into a plan of action, one with some urgency associated with it.

- The Department of the Environment should coordinate a public outreach program regarding the value of parks, open space and individual trees. Disseminate information through outlets such as utility bills, new homeowner packets and other mass outlets. A program of education on the current policies and city codes associated with City trees as well as information on what constitutes proper tree selection and care.
- The City of San Francisco should provide information and take input from citizens and community groups in those areas where residents are not completely satisfied with neighborhood trees, most notably North Beach, South of Market, Mission/Bernal and Excelsior/Outer Mission.
- The City of San Francisco should foster community participation and special celebrations associated with major planting events like Arbor Day.
- The Department of the Environment should engage the School District to incorporate tree care and Arbor Day celebrations into the elementary school curriculum.
- The Department of the Environment should engage the religious/spiritual community to incorporate tree planting and care into its programs.
- The City of San Francisco should offer creative opportunities to support urban forestry such as memorial tree plantings, adopt-a-tree programs, and a tree endowment fund.
- The Planning Department, Redevelopment Agency and Department of Public Works should specify that new developments and streetscapes must provide adequate space for trees and growing conditions that ensure their survival and development.
- The Planning Department, Redevelopment Agency and Department of Public Works should ensure that street design and redesign projects include trees as one of the project goals, protecting existing trees where appropriate, and providing adequate growing conditions for new trees.
- The City of San Francisco should publicly commemorate outstanding contributions to the urban forest from individuals, community organizations, city agencies and donors.

***Goal 4. Manage the urban forest in a coordinated, responsible and effective manner.***
San Franciscans want city government to take the lead role in managing the urban forest. They expect public agencies to be role models for its stewardship. Since the City does not have a centralized urban forestry department, there is a need for interagency coordination, communication, and consistency of action. The Department of the Environment currently meets the role of coordinator. Additional steps are needed:

- The City of San Francisco, through the Department of the Environment should establish an interdepartmental working group composed of all departments and agencies that have urban forest management responsibility.
- The City of San Francisco should establish clear lines of responsibility within City government for planting, maintenance and management of the urban forest.
- The City of San Francisco should develop standards and best management practices for tree selection and care. It must ensure that all City departments and projects employ the standards.
- The City of San Francisco should direct the Department of the Environment to establish a sub-committee of the Urban Forest Council to work with owners of open space parcels on issues of common interest.

- The City of San Francisco should develop standards for the planting and maintenance of all new plantings by all agencies and contractors in the City.
- The City of San Francisco should incorporate trees in all street redesign projects, which provide pedestrian, bicyclist and traffic calming benefits. Opportunities exist within the Pedestrian Master Plan and Traffic Calming Program Guidelines.
- The City of San Francisco should include urban forestry professionals in the City departments (such as Planning) to provide expertise, review plans, troubleshoot potential problems, and follow through on maintenance and management of the urban forest.

***Goal 5. Identify sustainable approaches for the funding and implementation of urban forest initiatives.***

Taking care of the urban forest requires a significant investment of labor, resources and skills and each stage in a tree's life requires a certain level of maintenance. Investing in pruning, watering and mulch for young trees will reduce maintenance costs in the long run as the forest ages. Properly maintaining a mature, aging forest resource is costly and more labor intensive than maintaining young trees. Funding has not kept pace with need. In fact, funding levels for tree care within City agencies has declined. The impact on care of the urban forest is clear and direct. For example, the Golden Gate Park Forest Management Plan created in 1980 outlined a 25 to 30 year tree replacement cycle for the park's aging forests and yet in 1998, the reforestation project was operating on a 50-year cycle. Creating and caring for the existing urban forest and extending into underserved areas will require additional, stable financial resources.

In 2000, the Department of Public Works lost approximately 25% of its available funding for new planting when Proposition B expired. The Department suffered additional cutbacks due to the loss of sales tax revenue. This occurs at the same time that trees planted by Friends of the Urban Forest are maturing and in need of additional care. Moreover, planting has not kept pace with removals. In short, there is a crisis in funding the street tree program.

The Recreation and Park Department and the Department of Public Works are only the two most obvious examples of the inadequacy of current funding to sustain the existing urban forest. Other City departments with tree and forest management responsibility face similar shortfalls. Without increases in funding base, the City cannot care for its urban forest.

## V. Working the Plan: Action Items and Next Steps

Implementation of the goals and action items will require a coordinated effort by all who hold San Francisco's urban forest important. The City of San Francisco must take the leadership role. The City owns some of the most significant parts of the urban forest, sets the policies and funding for their management, and is the role model for other owners and managers. While a number of City departments will be involved, the burden of leadership will rest with the Department of the Environment's Urban Forest Council, the Department of Public Works, and the Recreation and Park Department.

Although all of the action items are important, several stand out as requiring immediate attention:

1. **The City of San Francisco should develop a citywide set of standards and best management practices for tree selection, purchase, installation and care.** The City of San Francisco's tree management is the model for how private property owners will manage theirs. For this reason, the City needs creative approaches, consistent standards and quality tree care. The Urban Forest Council should take the lead to create standards, which include:

    a. Best practices for tree planting including recommended species, nursery selection, structural evaluation, soil volume, etc.
    b. Uniform tree pruning standards for all City departments based on the most recent editions of the American National Standard for Tree Care Operations (ANSI Z133 and A300) as well as the Best Management Practices prepared by the International Society of Arboriculture.
    c. All City employees who have responsibility for tree management should be qualified and participate in industry continuing education programs. The basic qualification is the Certified Arborist program of the International Society of Arboriculture.

2. **The City of San Francisco should protect existing trees from and during development.**

    a. Require tree protection plans for construction and development projects. The Department of Planning should establish goals, guidelines and forms to track trees before and after projects.
    b. Establish a Landmark Tree Program to celebrate and protect notable trees in San Francisco using a range of subjective and objective factors.
    c. Develop an awards program that recognizes innovative examples of projects that protect valuable trees.
    d. Require that City agencies, private developments and individual citizens are all held to a consistent set of standards.
    e. Encourage state and federal agencies, along with other public institutions exempt from City policies, to adhere to City tree protection requirements.

3. **The City of San Francisco should establish a goal of no net loss of trees on public and private property.** Where a tree is removed due to development whether public or private, the responsible party should be required to replace its value, either through new planting or in-lieu fees.

    a. Goal of no net loss should be required for all City agencies and incorporated into policies and ordinances used by private property owners.

b. Value of trees should be established using the Council of Tree and Landscape Appraisers methodology.
c. Trees that are diseased, dying, dangerous and in otherwise poor condition can be exempt from certain requirements.

4. **City of San Francisco departments should institute a comprehensive reforestation program in City parks and public institutions.** How the trees are managed and cared for in public parks and facilities is a physical representation of the City's concern and commitment. An aggressive reforestation program in these locations will demonstrate the City's support for tree planting and maintenance.

   a. Work with the Planning Department to incorporate tree planting in the landscape master plan for projects.
   b. Collaborate with Green Schoolyard Alliance, Living Library and other community groups to develop tree programs at SF Public School District and private schools.
   c. Work with the Recreation & Park to reinstate the 30-year rotation for reforestation at Golden Gate Park and implement existing forest management plans.
   d. Assist public institutions like Laguna Honda Hospital with developing and implementing urban forestry management plans.

5. **The City of San Francisco should allocate and secure funding for tree planting and maintenance from public and private sources including partnerships.** San Francisco's Urban Forest Council has the responsibility to identify and secure stable funding to support the planting efforts we propose. In its Street Tree Action Plan, the Council identified funding needs over the next 20 years. A research project supported by the Council indicated voter approval of a dedicated sales tax increase, a general parcel tax, or neighborhood assessment district would be problematic. As a result, the Council is currently exploring creative options that do not involve taxes or general funds allocations. The following items are suggested possibilities for funding options for the urban forest.

   By themselves, none of these would yield $20 million annually, but taken together, we get quite close.

   **A. Amend Section 143 of the Planning Code:**
   For renovation projects involving more than $25,000, the property owner could be required to plant street trees. If there is an existing street tree or no room to plant one, or the Planning Department waives the requirement, the property owner could pay the "in lieu fee" (currently $560) to the Adopt-a-Tree Fund or provide 10 to 20 years of maintenance for a street tree. For Neighborhood Commercial Districts, the requirement can be to plant 24" box trees or larger instead of 15 gallon trees. The application of Section 143 could be broadened to other districts, such as industrial districts.

   The number of subject renovations can be estimated based on the number of projects that are permitted through the Department of Building Inspection each year, which historically figures between 2,500 and 3,500 renovations. This proposal could generate upwards of $1.4 million to $2 million per year.

   Increasing the tree requirements for Planned Unit Developments is another practical way to increase the quantity and quality of street trees. Add a requirement to plant both sides

of the street adjacent to a Planned Unit Development or pay an in lieu fee if it is not possible.

B. **Increase parking meter revenue, dedicating a portion to tree planting & maintenance.**
There are three potential ways of doing this: 1) activating select meters on Sundays, 2) increasing the overall number of meters in the City, and 3) charging more per metered stay. There is a very clear nexus between private automobiles and the air-cleaning capabilities of our City's trees ($1.3 million per year). A public education campaign could be launched called "Sunday for Trees."

C. **Establish a Capital Campaign to build an Urban Forest Endowment.**
Much like the successful capital campaigns behind the Conservatory of Flowers or the Crissy Field projects, we could consider launching a similarly ambitious capital campaign to create an endowment, the interest on which would provide a portion of our annual need.

D. **Establish environmental impact fees for large-scale developers.**
A progressive fee: the nexus exists between the ability of trees to mitigate the impact of increased automobile traffic on air quality, air pollution, impervious surface, and visual blight. The fee would not require a campaign or election cycle. This fee would mitigate traffic and air quality impacts by requiring the planting of trees, or alternatively to contribute to a fund for the planting of street trees. Again, the recent Urban Forest Council data demonstrates the quantitative link between air quality and trees.

E. **Establish a set-aside for Proposition K sales tax revenue for urban forestry.**

F. **Encourage private initiatives through assessment districts or other means, thus enabling communities to take greater responsibility in implementing tree plantings and reforestation efforts**

G. **Set aside funding for urban forestry from the General Fund.**

In addition to the specific funding sources noted above, a financially sustainable program must:

- Develop a consistent message about the urban forest and communicate it among city, state and federal leaders and agencies.
- Identify planting of urban trees as an important mitigation for the environmental impact of a wide range of projects.
- Develop programs for gifting by charitable foundations, groups and individuals.
- Aggressively pursue and secure funding from public and private sources for planting and maintenance.
- Establish stable funding for community stewardship programs like Friends of the Urban Forest, Neighborhood Parks Council, and more.

6. **The City of San Francisco should establish one or more goals for the urban forest and monitor the results periodically.** Because the benefits of the urban forest are directly related to extent of tree canopy, an increased canopy would provide additional benefits to the City's residents and visitors. The Urban Forest Council Street Tree Action Plan is a blueprint to reach the following goals

a. One street tree for every 5 residents, raising the number of street trees from 106,000 to 155,000.
b. 15% canopy coverage, increasing the number of trees in the City from 668,000 to 835,000.

In terms of monitoring
c. Complete and periodically update a street tree inventory in a centralized database.
d. Update the UFORE study in five years.

7. **The City of San Francisco should update the list of recommended trees.** *Trees for San Francisco -- A guide to street-tree planting and care* was published in 1995 and needs to be revised. Friends or the Urban Forest and the Department of Public Works can lead the efforts to update the list of recommended trees. The list of recommended trees should reflect tree availability, horticultural advancements and the local character and identity of San Francisco. Furthermore, the list of planting situations needs to be expanded beyond street trees. A related idea is creating a list of "recommended plants" to place underneath trees. Likewise, a list of "plants to avoid" will prevent people from choosing undesirable or invasive vegetation that interferes with the health of the tree.

8. **Elected and community leaders in San Francisco should implement tree planting programs targeting underserved neighborhoods in order to achieve more environmental equity and accessibility.** The North Beach, Sunset, Merced, Potrero Hill, Bayview/Hunters Point, and Excelsior-Outer Mission districts have a lower number of street trees than other areas of the City. In order to rectify this situation:

   a. Direct the Department of Public Works to provide additional funding to the Friends of the Urban Forest to initiate planting projects in these neighborhoods.
   b. Engage the local community groups to support tree planting and aftercare.
   c. Direct City facilities to initiate tree planting efforts on City property.
   d. Incorporate tree planting into larger neighborhood improvement efforts.
   e. Facilitate programs to create miniparks and permeable landscaping where open space is limited (Plant*SF, Sidewalk Pocket Park Gardens, DPW Street Parks).

9. **The City of San Francisco should engage the SF Unified School District, Parent Teacher Associations and community groups to develop tree planting and care programs.** Tree programs at schools provide shade, UV radiation protection, education and engagement.

   a. Assist Friends of the Urban Forest develop a tree outreach program to schools and school groups. Provide information for tree planting and maintenance.
   b. Support existing groups like the Green School Yard Alliance and Living Library that are developing gardens and trees on school property.
   c. Incorporate arboriculture, urban forestry and forest conservation into school curriculum activities.
   d. Secure funding and in-kind donations for tree planting and care in schools through government and private sources.
   e. Develop a recognition program to acknowledge tree planting and care at schools.
   f. Encourage tree care professionals, school families and neighbors to donate time, money and resources for school trees.

The Urban Forest Council urges the City of San Francisco to take immediate action on the nine steps listed above as there is no time to lose.